IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

| | | |
|---|---|---|
| In re CASSAVA SCIENCES INC. SECURITIES LITIGATION | § § § | Master File No. 1:21-cv-00751-DAE |
| | § | CLASS ACTION |
| This Document Relates to: | § § | |
| ALL ACTIONS | § § | |

**AFFIDAVIT OF SCOTT CAMPBELL IN SUPPORT OF DEFENDANTS' MOTION TO EXCLUDE THE CLASS CERTIFICATION TESTIMONY OF DR. STEVEN FEINSTEIN**

I, Scott Campbell, declare under penalty of perjury:

1. I am an attorney at the law firm of Gibson, Dunn & Crutcher LLP, am admitted *pro hac vice* to the above-referenced action, and am counsel for Defendants Cassava Sciences, Inc. and Eric J. Schoen in the above-referenced action. I submit this affidavit in support of Defendants' Motion to Exclude the Class Certification Testimony of Dr. Steven Feinstein.

2. Attached are true and correct copies of the following exhibits:

Exhibit A: Excerpts of September 13, 2024 Deposition of Dr. Steven Feinstein.

Exhibit B: Excerpts of June 14, 2024 Deposition of Dr. Steven Feinstein.

Exhibit C: Excerpts of O. Miguel Villanueva & Steven Feinstein, "Stock Price Reactivity to Earnings Announcements: The Role of the *Cammer/Krogman* Factors," *Review of Quantitative Finance and Accounting* (2021).

Exhibit D: Excerpts of William F. Sharpe, *Investments* (1981).

Exhibit E: Excerpts of James Tobin, "On the Efficiency of the Financial System," *Lloyds Bank Annual Review* (1984).

Exhibit F: Excerpts of Bradford Cornell & John Haut, "How Efficient is Sufficient: Applying the Concept of Market Efficiency in Litigation," *Business Lawyer* (2019).

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 27, 2024.

/s/ *Scott Campbell*
SCOTT CAMPBELL

# EXHIBIT A

IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF TEXAS

AUSTIN DIVISION

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IN RE:

CASSAVA SCIENCES, INC., Master File No.

SECURITIES LITIGATION 1:21-cv-00751-DAE

This Document Relates to:

ALL ACTIONS

\- - - - - - - - - - - - - - - - - - x

VIDEO DEPOSITION of STEVEN P. FEINSTEIN, PhD, CPA

Friday, September 13, 2024 - 10:30 a.m.

Crowninshield Financial Research

56 Harvard Street

Brookline, Massachusetts

Reporter: Jill K. Ruggieri, RPR, RMR, FCRR, CRR

APPEARANCES:

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Also present: Brendan Travers (via Zoom)
Videographer: Bob Giannini

I N D E X

WITNESS:

STEVEN P. FEINSTEIN, PhD, CFA



E X H I B I T S

Q Have you ever opined that a market for a public security was inefficient? 10:59:10 10:59:13

MS. JENSEN: Objection. 10:59:18

I believe this was asked at the first deposition. This is, again, retreading old ground from the first report and the first deposition. 10:59:19 10:59:20 10:59:22 10:59:24

**A I've opined that there are places to look for stocks that are likely to be trading inefficiently. 10:59:28 10:59:29 10:59:32**

**When I teach my classes, I 10:59:33**

**explain to the students how you might find an inefficiently priced stock that you can exploit for gain.** **10:59:36** **10:59:39** **10:59:43**

Q What do you tell them about that? 10:59:43

**A Basically, I go through the Cammer factors and negate them all.** **10:59:44** **10:59:46**

**So I say if you find a stock that has no analyst coverage, it's a small stock, no volume, maybe not even listed on an exchange, trading over the counter on the pink sheets, that you have a much better chance of finding an inefficient badly price- -- or incorrectly priced stock than a stock that's large, trading on an exchange with the benefit of analyst coverage.** **10:59:50** **10:59:51** **10:59:54** **10:59:58** **11:00:01** **11:00:04** **11:00:07** **11:00:09** **11:00:11**

**I also tell -- I also tell the students that if they're going to go look for these stocks, they might want to look locally so they can gather information that wouldn't be picked up by news media or analysts.** **11:00:13** **11:00:16** **11:00:18** **11:00:20** **11:00:22**

Q That's describing the conditions under which there might be a stock that's not being priced efficiently. 11:00:26 11:00:28 11:00:34

Are there any examples you've given your students or anyone else? 11:00:37 11:00:39

MS. JENSEN: Objection. 11:00:41
Misstates. 11:00:41

**A They've come back to me with 11:00:44
examples, and I'll look at it and say there's a 11:00:46
good chance you're right that that stock meets 11:00:49
that -- those criteria and the price seems to 11:00:51
be wrong, so it would be fundamentally 11:00:58
efficient. That's what you're looking for if 11:01:01
you're trying to beat the market. 11:01:04**

**So I've opined -- I've never -- 11:01:05
yeah, I've opined that they've come back with 11:01:07
examples of stocks that appear to be 11:01:09
inefficiently priced, over-the-counter, pink 11:01:11
sheet stocks, local, small, not covered with 11:01:14
any analyst coverage, no volume, that sort of 11:01:16
thing. 11:01:19**

Q Can you remember the names of any of 11:01:19
those stocks? 11:01:21

**A No. 11:01:23**

Forgetting when your students came to you with an example, have you on your own ever looked at movement of a stock price and determined it was not an efficient market? 11:03:39 11:03:40 11:03:44 11:03:46

MS. JENSEN: Objection. Asked and answered. 11:03:52

**A I'm going to answer that question, but I'm also going to -- at a -- 11:03:56**

**I found examples where I've told people I don't think I would be able to prove it is efficient, but I also can't prove it's inefficient. That's what I've done. 11:04:01**

Q What are those examples? 11:04:13

**A I don't recall as I sit here now, but that happens. It happens from time to time, I mean, with some regularity. 11:04:15**

**And, again, it's usually a small stock, micro cap, no analyst coverage, not listed on an exchange, no volume, that sort of thing. 11:04:22**

**But I would say looking at those factors, maybe it's trading efficiently. But no one's going to be able to prove it, including me. 11:04:31**

Q Have you ever testified in connection with a pending litigation that a market was inefficient for a stock? 11:04:44

MS. JENSEN: Again, I'm going to object. This is -- certainly could have been 11:04:53

asked in the first deposition. May have been. 11:04:55
We didn't sit here today for a 11:04:57
second deposition about the first report. 11:04:58
**A No. I mean, I have testified that 11:05:04**
**efficiency was improved, but I've never 11:05:08**
**testified that I've proved a stock to be 11:05:12**
**trading inefficiently. 11:05:14**
Q When did you testify that an 11:05:15
efficiency had not been improved? 11:05:16
**A I don't recall. I just recall that I 11:05:18**
**have done that. I don't recall the -- the 11:05:20**
**case, but that's definitely something I've 11:05:23**
**done. 11:05:26**

Q You mentioned in your answer the tulip craze in the 17th-century Holland. 11:37:46 11:37:49

Was that an example of an efficient market? 11:37:53 11:37:54

**A I don't know. I know that it's an example of -- I know that it's often brought up as an example. I also -- of an inefficient market. 11:37:58 11:38:00 11:38:04 11:38:08**

**But I also know that there's actually been some revision to the understanding of that phenomenon, and some 11:38:09 11:38:10 11:38:14**

**people have pointed out that the most expensive tulip bulbs that are often touted in the news -- you know, cost more than a person's house -- were very, very rare, you know, tulip bulbs, not the common tulip bulbs that most people would buy and sell and have.** **11:38:16** **11:38:19** **11:38:21** **11:38:24** **11:38:27** **11:38:32**

**So I -- I don't know. I couldn't say. I mean, I would have to study that.** **11:38:37** **11:38:38** **11:38:40**

**I mean, when I make a market efficiency -- when I offer a market efficiency opinion, I base it on research of the market characteristics and also empirical studies, and I haven't conducted those for the tulip market.** **11:38:40** **11:38:42** **11:38:46** **11:38:49** **11:38:51**

**I've read articles about it, but I haven't studied -- I haven't done my own research, so I can't offer an opinion.** **11:38:53** **11:38:55** **11:38:57**

Q It's your view that the infamous tulip craze in the 17th century may have been a market operating efficiently? 11:39:01 11:39:04 11:39:08

MS. JENSEN: Objection. Misstates. 11:39:09 11:39:10

**A I just don't know. I know that recently there's been some revision to that understanding and people are pointing out that** **11:39:10** **11:39:13** **11:39:15**

**maybe -- maybe it was. 11:39:16**

**I mean, that -- I know -- I just couldn't offer an opinion because my opinions are based on conclusions from research, and I haven't conducted that research. 11:39:17 11:39:22 11:39:24 11:39:30**

Q But you're not willing to say that the tulip craze in the 17th century was an inefficient market? 11:39:33 11:39:34 11:39:37

MS. JENSEN: Objection. Asked and answered. 11:39:39 11:39:39

**A Inefficient -- what -- informationally inefficient or fundamentally inefficient? 11:39:41 11:39:41 11:39:45**

Q Informationally. 11:39:47

**A I don't know. We'd have to look to see whether information about tulips was impacting the stock -- the tulip prices, and we'd have to look at what -- what were reasonable valuation models. 11:39:48 11:39:50 11:39:52 11:39:55 11:39:58**

**There was certainly a lot of sentiment where people wanted tulips and were willing to pay for them, and that sentiment changed. 11:40:00 11:40:02 11:40:06 11:40:10**

**reporting. I would want to check. 11:53:59**
Q What's changed between now and the previous answer you gave about GameStop's S-3 registration? 11:54:04 11:54:06 11:54:08
MS. JENSEN: Objection. Harassing. Argumentative. 11:54:09 11:54:10
**A I think maybe the way you asked the question. 11:54:11 11:54:13**
**Could I hear that S-3 question again about GameStop? 11:54:13 11:54:15**
Q I don't think we're going to go back 30 minutes to a question. 11:54:18 11:54:20
Let's move on to Cassava's stock price. Let's look at page 1 -- I'm sorry, paragraph 142 of Exhibit 1, which is your rebuttal report. 11:54:24 11:54:25 11:54:29 11:54:33
And in paragraph 142, are you discussing Cassava's stock having a 35 percent price increase on September 18 of 2020? 11:54:56 11:54:59 11:55:02
**A Yes. 11:55:09**
Q And your report attributes that price increase to Cassava's filing of a Form F, noting that executives had bought shares of Cassava stock; is that right? 11:55:12 11:55:14 11:55:18 11:55:22
MS. JENSEN: Sorry, what 11:55:29

paragraph? 11:55:30
MR. COSTA: Sorry. That was 11:55:31
142. Is it? Maybe it goes on in the -- 11:55:32
MS. JENSEN: I just don't see 11:55:35
that last part that you asked about. 11:55:35
MR. COSTA: Go up to 140. 11:55:46
MS. JENSEN: Okay. 11:55:48
MR. COSTA: Two paragraphs. 11:55:48
It's the whole subpart (i). 11:55:49
MS. JENSEN: Okay. 11:55:54
**A Well, there was news that day that 11:55:55**
**could explain the price movement. That's what 11:55:57**
**I point out in paragraphs 140 through 143. 11:56:00**
Q What was that news? 11:56:02
**A Insiders were buying the stock. That 11:56:04**
**news broke. The market -- there was a great 11:56:06**
**deal of uncertainty in the market about whether 11:56:11**
**the studies Cassava was running supported that 11:56:13**
**their drug would be approved and was 11:56:15**
**efficacious and safe or not. 11:56:17**

Q So it's your opinion that the Form 4 filing, because no other information or news was released that day, is responsible for the 35 percent price increase? 11:57:32 11:57:35 11:57:37 11:57:41

MS. JENSEN: Objection. 11:57:45
Misstates. 11:57:45
**A My opinion is that it certainly can 11:57:46**
**explain it, but the price movement that day can 11:57:48**
**be explained by this news, and it is not an 11:57:52**
**example of the stock moving on no news. 11:57:56**
**It's an example of the stock 11:57:59**
**moving on news when new -- when positive 11:58:00**
**material news was disseminated. 11:58:02**
Q If this Form 4 disclosure could, as 11:58:07
you put it, have had such a significant effect, 11:58:08
over a third of an increase on the stock price, 11:58:10
wouldn't you expect analysts to -- at least one 11:58:16
analyst somewhere to comment on it? 11:58:19
MS. JENSEN: Objection. 11:58:21
Speculation. 11:58:22
**A Not always. Sometimes yes; sometimes 11:58:23**
**no. 11:58:25**
Q You're aware that no analyst 11:58:26
commented -- 11:58:28
**A Not -- 11:58:28**
Q -- on this Form 4 filing on 11:58:28
September 18th? 11:58:31
MS. JENSEN: Objection. Asked 11:58:31
and answered. 11:58:32

**A I'm aware that --** **11:58:37**
Q I'd ask that you let me finish my question. 11:58:37 11:58:40
**A -- Dr. Stultz apparently didn't notice it. No, but I can go look at that.** **11:58:40** **11:58:42**
MS. JENSEN: Hold on a sec. 11:58:45
You weren't done with your question? 11:58:46 11:58:47
MR. COSTA: Well, you talked over half of it. 11:58:47 11:58:48
MS. JENSEN: I apologize. I thought you were done with your question. 11:58:49 11:58:50
Q Are you aware that no analyst commented on this Form 4 disclosure before the 35 percent price increase on September 18th? 11:58:52 11:58:55 11:58:59
MS. JENSEN: Objection. Asked and answered. 11:59:02 11:59:02
**A I reviewed the analyst reports that were written. I don't recall as I sit here now -- that wasn't the focus --** **11:59:06** **11:59:08** **11:59:11**
**It wasn't my purpose to put in a new analysis, a new opinion, a new assertion that the stock was reacting to news on this day.** **11:59:15** **11:59:17** **11:59:23** **11:59:25**
**These paragraphs are written to** **11:59:26**

**show that Dr. Stultz made fatal errors in executing his study and that he overlooked that there was positive news on that day -- was positive material news that can explain the increase in Cassava stock price that day.** **11:59:27 11:59:30 11:59:33 11:59:38 11:59:41**

**Whether or not analysts covered it or not/commented or not wasn't necessary for the opinion that I'm offering and for the paragraphs that I wrote.** **11:59:45 11:59:48 11:59:53 11:59:55**

Q But analyst coverage is a relevant consideration in determining price impact, correct? 11:59:56 11:59:59 12:00:02

MS. JENSEN: Objection. Argumentative. 12:00:02 12:00:03

**A When you say "price impact," do you mean the -- the price impact as --** **12:00:05 12:00:07**

Q From the -- 12:00:11

**A -- in the legal sense --** **12:00:11**

Q From the funding source. 12:00:12

**A -- or just the fact that the information had an impact -- had an effect on the stock price?** **12:00:14 12:00:15 12:00:18**

Q The latter. 12:00:19

**A Not like a price impact analysis for purposes of class certification, but rather** **12:00:20 12:00:22**

just the question of did the stock react to information or did it move on no information at all? 12:00:26 12:00:30 12:00:33

Okay. So that's -- I'm asking you for clarification. 12:00:35 12:00:36

Q The latter. 12:00:38

A Well, for purposes of understanding did the stock move on no information at all, no, I don't have to look at analyst reports. No one would have to. 12:00:39 12:00:41 12:00:43 12:00:45

Q I'll ask it again.
Have you observed similar massive price changes in response to Form 4 filings before? 12:02:52 12:02:53 12:02:55 12:02:59

MS. JENSEN: Objection. Asked and answered. 12:03:01 12:03:01

**A I may have. I'd have to go look. I mean, a company that -- whose valuation could be $20 billion market cap or zero, depending on what insiders know, is a company whose stock will move a lot when there's this kind of announcement, often. 12:03:02 12:03:04 12:03:09 12:03:18 12:03:22 12:03:24**

Q Just to clarify, since I must not be clear in my questioning, I'm asking if you know of examples of other stocks -- and also, this was a 35 percent price increase; I'll just say 20 percent -- that moved 20 percent on no news other than the filing of a Form 4? 12:03:27 12:03:34 12:03:36 12:03:40 12:03:43 12:03:47

MS. JENSEN: Objection. Incomplete hypothetical. 12:03:48 12:03:51

**A Not as I sit here now. I com- -- not as I sit here now. 12:03:53 12:03:55**

**And I compared this movement to whether it was reasonable or not reasonable to the range of valuations that were offered by market participants over the course of the class period based on what the truth about Simufilam was. 12:03:57 12:03:58 12:04:02 12:04:04 12:04:06 12:04:11**

MR. COSTA: I'll object to everything after "not as I sit here now." 12:04:13 12:04:14

MS. JENSEN: We oppose. 12:04:17

Q So is it fair to say your testimony here is that given all these -- you've spent a lot of time talking about these unique dynamics with Cassava stock -- that given those unique dynamics, it's possible that the 35 percent price increase was attributable just to the 12:04:18 12:04:21 12:04:24 12:04:27 12:04:30 12:04:33

filing of the Form 4? 12:04:35
**A Yes. 12:04:37**
Q Are you aware that Cassava -- the 12:04:40
Form 4 filed -- Form 4s filed at other times 12:04:43
during the class period? 12:04:48
**A Yes, but there may have been 12:04:49**
**different levels of uncertainty at other times. 12:04:51**
Q Are you aware how close in time to 12:04:57
the September 18th filing we just discussed 12:05:00
those other Form 4s were filed? 12:05:06
**A Not as I sit here now. 12:05:11**

BY MR. COSTA:

Q So there was a question before we 12:25:36
broke that wasn't answered, which is whether 12:25:38

you were aware of any statistically significant price change associated with the filing of the Form 4 on September 24th -- 21st, sorry, 21st, which is Exhibit 4.

MS. JENSEN: Can you see it?

THE DEPONENT: I need a piece of paper.

(The deponent read the document.)

I'll just ask the question. Was there a relevant or statistically significant price change on 9/22? 12:27:49 12:27:50 12:27:51

**A Well, the price did go up from $9.82 to $10.45, which is four and a half percent on a logarithmic basis, residual logarithmic basis, 6 percent on a raw basis and -- 12:27:53 12:27:58 12:28:03 12:28:06**

**But it's not statistically significant. It's a rise, but it's not statistically significant. 12:28:11 12:28:13 12:28:15**

Q This will be Exhibit 7. This is also in 2023. 12:34:54 12:34:57

(The deponent read the document.) 12:35:09 12:35:09

Q Do you recognize this as another Form 4 that Cassava filed, this time the filing on August 23rd? 12:35:12 12:35:16 12:35:20

**A Right, right. This is far after that -- well, a lot of events had occurred by 12:35:23 12:35:26**

**then.** **12:35:29**

**Yeah, this is filed on** **12:35:31**
**August 23, 2023.** **12:35:32**

Q Was there a statistically significant 12:35:35
price change on August 24th of '23? 12:35:37

**A No.** **12:35:57**

Q So I understand the limited purpose of what you wrote in the reply. 12:45:51 12:45:54

I'm asking just generally under your framework for studying market efficiency, how would you determine when a news event stopped having impact on the price? 12:45:59 12:46:01 12:46:04 12:46:06

MS. JENSEN: Objection. Beyond the scope. 12:46:11 12:46:12

**A Well, I mean, one could look at the price. And if there's a continued price reaction, one could look at volume to see if there continues to be elevated volume. 12:46:15 12:46:18 12:46:21 12:46:24**

C E R T I F I C A T E

I, Jill K. Ruggieri, Registered Merit Reporter and Certified Realtime Reporter, do certify that the deposition of STEVEN P. FEINSTEIN, PhD, CFA, in the above-captioned matter, on September 13, 2024, was stenographically recorded by me; that the witness provided satisfactory evidence of identification, as prescribed by Executive Order 455 (03-13) issued by the Governor of the Commonwealth of Massachusetts, before being sworn by me, a Notary Public in and for the Commonwealth of Massachusetts; that the transcript produced by me is a true record and accurate record of the proceedings to the best of my ability; that I am neither counsel for, related to, nor employed by any of the parties to the above action; and further that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of the action.

Jill K. Ruggieri

Jill K. Ruggieri, RPR, RMR, FCRR, CRR

Transcript review was requested of the reporter.

**ERRATA SHEET:**

**Case Name: In Re: Cassava Sciences, Inc. Securities Litigation**
**Deposition Date: 09/13/2024**
**Deponent: Steven P. Feinstein, Ph.D., CFA**

**I wish to make the following changes for the following reasons:**

| Pg. | Ln. | Now Reads | Should Read | Reasons Therefore |
|---|---|---|---|---|
| Cover Page | | 10:30 a.m. | 10:00 a.m. | Factual correction (not deponent's error) |
| Cover Page | | CPA | CFA | Factual correction (not deponent's error) |
| 4 | 18 | CRA | CFA | Factual correction (not deponent's error) |
| 8 | 13 | Stultz | Stulz | Transcription (same error throughout transcript) |
| 9 | 1 | 3 | 3-to-1 | Clarification or Transcription |
| 9 | 2-3 | worked it | worked on it | Clarification or Transcription |
| 9 | 15 | Stultz | Stulz | Transcription |
| 14 | 24 | Ren M. Stultz | Rene M. Stulz | Transcription |
| 16 | 24 | Stultz | Stulz | Transcription |
| 18 | 14 | Stultz | Stulz | Transcription |
| 21 | 10 | Marketing | Market | Transcription |
| 30 | 6 | an | with | Transcription |
| 31 | 4 | no-information | non-or-lesser information | Clarification |
| 32 | 4 | Stultz's | Stulz's | Transcription |
| 39 | 1 | finance | finance principle | Transcription |
| 41 | 25 | Stultz | Stulz | Transcription |
| 44 | 2 | Stultz | Stulz | Transcription |
| 47 | 3 | Stultz's | Stulz's | Transcription |
| 63 | 9 | Stultz | Stulz | Transcription |
| 63 | 21 | Stultz | Stulz | Transcription |
| 66 | 11-12 | sole active index that Dr. Stultz | Solactive index that Dr. Stulz | Transcription |
| 66 | 20 | Stultz | Stulz | Transcription |
| 70 | 7 | Stultz | Stulz | Transcription |
| 77 | 10 | Stultz | Stulz | Transcription |
| 99 | 14 | Stultz | Stulz | Transcription |
| 101 | 4 | Stultz | Stulz | Transcription |
| 102 | 1 | Stultz | Stulz | Transcription |
| 103 | 22 | Stultz's | Stulz's | Transcription |
| 113 | 15 | Stultz | Stulz | Transcription |
| 115 | 22-24 | **Where else in your did you conclude that a return of roughly 13 percent was statistically significant?** | Q Where else in your did you conclude that a return of roughly 13 percent was statistically significant? | This is questioner's question, not deponent's answer. |
| 118 | 4 | listed | elicited | Transcription |
| 125 | 5 | Stultz | Stulz | Transcription |
| 126 | 5 | Stultz | Stulz | Transcription |
| 127 | 10 | 6th | 2nd | Transcription |
| 128 | 25 | Stultz | Stulz | Transcription |
| 129 | 5 | Stultz | Stulz | Transcription |
| 130 | 3 | Stultz | Stulz | Transcription |
| 135 | 22 | movements | movement | Transcription |
| 135 | 23 | days | day | Transcription |
| 135 | 24 | were | rose | Transcription |
| 141 | 7 | Jones Report | A Jones Trading report | Clarification |
| 141 | 14-15 | is what came out during that week based on Biogen getting its approval. | was reported by an analyst earlier in February 2021. | Factual Correction |
| 145 | 23 | Stultz's | Stulz's | Transcription |
| 149 | 15 | I didn't find | It's just that I didn't find | Clarification or Transcription |
| 149 | 17 | generally accepted | and generally accepted | Clarification |
| 149 | 20 | ten | thirty-four days | To conform to the facts |
| 149 | 22 | two | three | To conform to the facts |
| 150 | 13 | two | three | To conform to the facts |
| 150 | 20 | Stultz | Stulz | Transcription |
| 151 | 19 | Stultz | Stulz | Transcription |
| 151 | 24 | Stultz | Stulz | Transcription |
| 152 | 20 | Stultz's | Stulz's | Transcription |
| 155 | 17 | Stultz | Stulz | Transcription |
| 157 | 3 | Stock | The stock | Clarification |
| 162 | 3 | Stultz | Stulz | Transcription |
| 164 | 4 | Stultz | Stulz | Transcription |
| 167 | 19 | basis is one | basis, that is one | Transcription |
| 167 | 21 | Stultz's | Stulz's | Transcription |
| 167 | 22 | just proved | disproved | Transcription |
| 167 | 23 | commonly significant | commonly significantly | Transcription |
| 174 | 4 | Stultz | Stulz | Transcription |

STEVEN P. FEINSTEIN, Ph.D., CFA

Subscribed and sworn before me
this 24th day of October, 2024.

ALISON D. LEVINS
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
April 3, 2026

# EXHIBIT B

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

| | |
|---|---|
| In re CASSAVA SCIENCES INC. SECURITIES LITIGATION, | ) |
| | ) Master File No. 1:21-cv-00751-DAE |
| This Document Relates to: | ) |
| ALL ACTIONS. | ) |

VIDEOTAPED DEPOSITION OF STEVEN FEINSTEIN, Ph.D., CFA

SAN DIEGO, CALIFORNIA

FRIDAY, JUNE 14, 2024

9:08 A.M.

Stenographically reported by:

Kayla Lotstein

California CSR No. 13916, CRR, RPR, CRC

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

In re CASSAVA SCIENCES INC. SECURITIES LITIGATION,
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This Document Relates to:
ALL ACTIONS.
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Master File No. 1:21-cv-00751-DAE

VIDEOTAPED DEPOSITION OF STEVEN FEINSTEIN, Ph.D., CFA, taken on behalf of Defendants, at 9:08 a.m., FRIDAY, May 17, 2024, at 655 West Broadway, Suite 1900, San Diego, California, before Kayla Lotstein, Certified Shorthand Reporter No. 13916 of the State of California, pursuant to Notice.

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Also Present:

Larry Maher, Videographer

Brendan Travers

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WITNESS: STEVEN FEINSTEIN, Ph.D., CFA

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EXHIBITS

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| 1 | "Exhibit E," Report on Market Efficiency and Damages Methodology, Professor Steven P. Feinstein, Ph.D., CFA, dated March 13, 2024 | 10 |
| 2 | Reuters Brief-Cassava Sciences Announces Positive cognition Data With Simufilam in Alzheimer's Disease; dated 29 July 2021; Bates-stamped FEINSTEIN_0004359 | 183 |
| 3 | Benzinga Article, "Why Cassava Sciences Shares Are Trading Sharply Lower Today," dated 29 July 2021 15:05; Bates-stamped FEINSTEIN_0004360 | 192 |
| 4 | JonesTrading Article dated July 29, 2021, "Raising PT to $215/BUY. 9-Month Data De-Risk 12-Month Data in 4Q21; Randomized Trial Data Could be in 1H/mid22"; Bates-stamped FEINSTEIN_ | 211 |

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INFORMATION TO BE SUPPLIED



QUESTIONS INSTRUCTED NOT TO ANSWER

Q Well, what else have you done? You mentioned you looked at news coverage, the Internet, and Google search, the Factiva search. You've looked at additional analyst reports and the judge's opinion on the motion to supplement.

Anything else?

**A Yes. As I'm thinking about it now, I did have one of my assistants check frequency of mention of Cassava on Reddit and count those numbers and compare them to the frequency of other stocks mentioned on Reddit, and it confirmed that my analysis was complete and that my conclusion was reliable, that -- that comparison. And I don't think I need to offer that because essentially what I did was confirm that my analysis was complete, which is the opinion I had at the time I turned in the report, and it's just further confirmed by additional data that I looked at since then.**

Q When did you do this Reddit analysis?

**A Sometime in the last two weeks.**

Q Do you still have the -- that analysis?

**A Well, I'm not sure if we have it written down, but it's easy to replicate. I asked someone to check**

**these numbers, and he checked them and reported them back to me.** 09:34:17 09:34:19

Q Who did you ask to check these numbers? 09:34:21

**A Luca Avila.** 09:34:23

Q And who's Mr. Avila? 09:34:25

**A He's an analyst at Crowninshield Financial Research.** 09:34:26 09:34:29

Q Why did you ask Mr. Avila to do this? 09:34:33

**A Well, counsel for Plaintiff's can stop me if I'm --** 09:34:36 09:34:38

THE WITNESS: Maybe I shouldn't? 09:34:38

MS. JENSEN: Don't reveal any communications with plaintiff's counsel. So if you can't answer that answer without revealing communications with the plaintiff's counsel, then I'll instruct you not to answer. 09:34:40 09:34:42 09:34:47 09:34:49

THE WITNESS: Well, should I answer or not? 09:34:52

I was made aware that defendants might try to make an argument that Cassava stock was inefficient because it was a, quote/unquote, meme stock, and so I just wanted to see if that was a reasonable argument or not. And that was one of the checks. 09:34:56 09:35:02 09:35:07 09:35:10 09:35:14

BY MS. LOSEMAN: 09:35:16

Q When were you made aware of this potential meme stock argument? 09:35:16 09:35:20

**A I think two weeks ago.** 09:35:21

Q Is there a reason you did not cite to any of it in your report? 09:40:49 09:40:51

**A It -- well, I -- I -- I can't preemptively anticipate every wild argument that might be levied.** 09:40:53 09:40:58

I -- I considered that one, gave it the due consideration, and determined that the generally accepted standard evaluation of market efficiency was the appropriate one. 09:41:02 09:41:06 09:41:10 09:41:13

I mean, I can't run -- I figured that if someone's going to raise that argument, I can get it on rebuttal. I didn't really need to address it in this opening report. 09:41:14 09:41:16 09:41:21 09:41:23

It's a -- Cassava stock did not -- did not range outside the range of what was reasonable given the information that was being disseminated about it, and all the market factors indicate market efficiency. The empirics indicate market efficiency. 09:41:24 09:41:25 09:41:28 09:41:30 09:41:37

I had that one question about how much was Cassava really being mentioned on the Internet, so I asked my assistant to look into it, and he confirmed for me that it was not nearly as much as the mention of -- of the stocks that are often cited in the short list of meme stocks. So that confirmed that my analysis was complete and appropriate. 09:41:41 09:41:43 09:41:45 09:41:48 09:41:50 09:41:54 09:41:58

BY MS. LOSEMAN: 10:14:00

Q Dr. Feinstein, before the break, we were 10:14:02
discussing this Reddit search that you conducted in the 10:14:04
last two weeks. 10:14:07

What were the parameters of that search that 10:14:08
you instructed your colleague to perform? 10:14:10

**A Well, my instructions were unparameterized.** 10:14:13

**Very simple. I said, "Luca, can you tell me how** 10:14:20
**frequently Cassava was mentioned on Reddit over the** 10:14:23
**course of the class period?" That's all I asked him.** 10:14:27
**He said, "Yes," and then later told me a** 10:14:31
**number.** 10:14:36
Q Do you recall what that number was? 10:14:36
**A Somewhere in the three hundreds, and then he** 10:14:38
**added that other companies like GameStop are, like,** 10:14:41
**30,000.** 10:14:48
Q Did he comment -- so you said he added 10:14:52
GameStop comments numbered in the 30,000. 10:14:57
Did he mention any other companies? 10:15:02
**A No.** 10:15:04
Q Did you ask him to compare the number of times 10:15:07
Cassava was mentioned to any other company, or did he do 10:15:10
that on his own? 10:15:15
MS. JENSEN: Asked and answered. 10:15:17
THE WITNESS: He did that on his own. 10:15:19

Q And have you provided opinions in other 04:50:14
securities litigation matters regarding a common damages 04:50:18

methodology at the class certification stage? 04:50:22

**A Yes, I have.** 04:50:26

Q And is this essentially the same opinion 04:50:26
you've provided in other securities class actions at the 04:50:30
certification stage about a common damages methodology? 04:50:38

**A No.** 04:50:43

Q What portion of this part of your report is 04:50:44
specific to Cassava and the alleged misrepresentations 04:50:48
and corrective disclosures here? 04:50:52

**A On paragraph 122, it says that "the** 04:51:27
**out-of-pocket damages methodology, which is the same** 04:51:31
**methodology that is used in virtually all 10b5 security** 04:51:34
**cases, is consistent in this case with this plaintiff's** 04:51:39
**theory of liability in this case."** 04:51:44
**So that's what paragraph 1 -- 222 says, and** 04:51:45
**that's never an opinion I've never offered before.** 04:51:49
**And also in 222, I say that "in this case, it** 04:51:52
**can be applied commonly to all class members -- or for** 04:51:55
**all class members."** 04:51:58

Q I'm sorry. I just want to make sure I 04:52:05
understand your testimony. 04:52:06
You said you've never offered the opinion 04:52:07
before that's expressed in paragraph 222? 04:52:15

**A Correct. That the out-of-pocket damages** 04:52:19
**methodology is consistent with plaintiff's theory of** 04:52:21

**liability in the -- in the Cassava case.** 04:52:25

**I mean, I've found that it's consistent with the theory of liability in many other cases, but not in the Cassava case. And so I evaluated the theory of liability in this case and determined that this, again, is the appropriate methodology, but that's analysis specific this to this case.** 04:52:27 04:52:30 04:52:33 04:52:37 04:52:40 04:52:44

Q So -- thank you for that -- that clarification. 04:52:46 04:52:47

So you're not saying you have never in any other case reached the conclusion that the out-of-pocket damages methodology is consistent with the plaintiff's theory of liability? 04:52:48 04:52:50 04:52:54 04:52:57

**A Correct. It almost always is, and --** 04:52:59

Q Have you -- 04:53:02

**A But that requires an understanding of the plaintiff's theory of liability, and I did that work here to see what the theory of liability is and whether it makes sense in this case to apply this damage methodology.** 04:53:02 04:53:05 04:53:07 04:53:10 04:53:13

Q Have you ever reached a conclusion in any 04:53:41
other engagement that the plaintiff's theory of 04:53:43
liability was not consistent with an out-of-pocket 04:53:46
damages method? 04:53:49
**A Yes. I mean, if it were -- if was a** 04:53:50
**securities case -- a 10b5 securities case.** 04:53:55
Q For any 10b securities case, have you -- 04:54:00
**A No.** 04:54:01
Q -- reached that conclusion? 04:54:01
**A Well, for the 10b5 claims, it -- I -- I found** 04:54:04
**that it always is. I mean, it's a commonly used** 04:54:07
**methodology. It's discussed in the legal and** 04:54:16
**professional literature as being the appropriate** 04:54:19
**methodology given the case law and given what's -- what** 04:54:22
**a 10b5 theory of liability usually is.** 04:54:26

BY MS. LOSEMAN:
Q If the alleged misrepresentation is about an event that occurs in -- just hypothetically speaking -- March of 2021. So the event occurs in March of 2021, and the alleged misrepresentation is regarding that event. It's a misrepresentation about that event. 05:07:58 05:08:03 05:08:15 05:08:19 05:08:24
How could there be a corrective disclosure in 2020 about an event that has not yet occurred? 05:08:27 05:08:33
**A Okay.** 05:08:37
MS. JENSEN: Incomplete hypothetical. Objection to form. 05:08:39 05:08:41
THE WITNESS: Well, just one answer to the question -- maybe -- might not -- might not be the -- all the answers, but it's -- one answer is that if this misrepresentation was a part of a scheme that had begun earlier and this misrepresentation had the effect of concealing and perpetrating -- or perpetuating the scheme, then a disclosure at the start of the class period that the company was set -- committed to perpetuating a scheme to deceive investors would 05:08:41 05:08:42 05:08:44 05:08:49 05:08:54 05:08:58 05:09:02 05:09:05 05:09:09

essentially insulate the stock price from any effect of the later misrepresentations. 05:09:13 05:09:15

So there could have been a disclosure that was -- that -- that preemptively corrected inflation that otherwise would be caused by a later misrepresentation. 05:09:17 05:09:19 05:09:22 05:09:25

BY MS. LOSEMAN: 05:09:27

Q And in constructing a damages analysis, you would have to disentangle -- right? -- the impact of any prior disclosure that -- in -- in that hypothetical answer you just provided somehow impacted the -- any change or non-change in the price of the stock when the alleged misrepresentation occurred; right? 05:09:27 05:09:29 05:09:34 05:09:37 05:09:44 05:09:49

MS. JENSEN: Objection to the form. 05:09:51

THE WITNESS: No. 05:09:53

The methodology is much more straightforward than that. 05:09:53 05:09:56

BY MS. LOSEMAN: 05:09:57

Q How so? 05:09:57

**A Well, what the methodology is to use all available information.** 05:09:58 05:10:01

**The information is set -- the information set that's available to investors on each day of the class period and assess, using all tools available, what would the stock price have been had there been no** 05:10:02 05:10:04 05:10:06 05:10:09

misrepresentations or omissions. That's -- then the difference between that but-for price and the actual price is artificial inflation, and the damage formula is the change in that artificial inflation over each investor's respective holding period. 05:10:13 05:10:17 05:10:20 05:10:25 05:10:27

This kind of disentangling or attribution generally is -- is not necessary in order to apply this very straightforward arithmetic damages methodology. 05:10:31 05:10:38 05:10:41

BE IT KNOWN that the foregoing proceedings were taken before me; that the witness before testifying was duly sworn to testify to the whole truth; that the foregoing pages are a full, true and accurate record of the proceedings, all done to the best of my skill and ability; that the proceedings were taken down by me in stenographic shorthand and thereafter reduced to print under my direction.

I CERTIFY that I am in no way related to any of the parties hereto, nor am I in any way interested in the outcome thereof.

( ) Review and signature requested.

( ) Review and signature waived.

(x) Review and signature neither requested nor waived.

IN WITNESS WHEREOF, I have subscribed my name this 17th day of June, 2024.

Kayla Lotstein

Kayla Lotstein, California CSR No. 13916

**ERRATA SHEET:**

**Case Name: In Re: Cassava Sciences, Inc. Securities Litigation**
**Deposition Date: 06/14/2024**
**Deponent: Steven P. Feinstein, Ph.D., CFA**

**I wish to make the following changes for the following reasons:**

| Pg. | Ln. | Now Reads | Should Read | Reasons Therefore |
|---|---|---|---|---|
| 2 | 14 | May 17, 2024 | June 14, 2024 | Factual correction (not deponent's error) |
| 7 | 1 | May 17, 2024 | June 14, 2024 | Factual correction (not deponent's error) |
| 11 | 6 | was complete report | was a complete report | Transcription |
| 12 | 16-17 | What is -- Factiva -- what articles does Factiva carry that mention Cassava? | The articles that Factiva carries that mention Cassava. | Transcription |
| 19 | 4 | opinion -- a final | opinion -- but not a final | Clarification or Transcription |
| 21 | 7-8 | tests are as | tests as are | Transcription |
| 22 | 23 | to not | did not | Transcription |
| 23 | 6 | what the | what was the | Transcription |
| 23 | 14 | I did | I did, | Transcription |
| 26 | 10 | mention | posts | Factual correction |
| 35 | 8 | a specific information | specific information | Transcription |
| 37 | 10 | arbitragers | arbitrageurs | Transcription |
| 38 | 17-18 | articles | posts | Clarification |
| 46 | 5 | number | number of posts | Clarification |
| 46 | 7 | Somewhere | Posts were somewhere | Clarification |
| 46 | 7 | hundreds, | hundreds during the Class Period on Wall Street Bets, | Clarification |
| 46 | 8-9 | like, 30,000 | have like, thousands on Wall Street Bets. | Clarification and factual correction |
| 46 | 21 | Valiant | Valeant | Transcription |
| 47 | 11 | Reddit | Wall Street Bets on Reddit | Clarification and factual correction |
| 55 | 4-7 | "take the market efficiency hypothesis to be the simple statement that security prices fully reflect all available information... a weaker | "I take the market efficiency hypothesis to be the simple statement that security prices fully reflect all available information. … A weaker | Transcription |
| 56 | 6 | market for Cassava | markets for Cassava | Clarification |
| 56 | 7 | was an efficient market | were efficient markets | Clarification |
| 60 | 4 | market | market, | Transcription |
| 65 | 25 | in inefficient markets | in efficient markets | Transcription |
| 67 | 8 | Could be | It could be | Transcription |
| 71 | 3 | valuated | evaluated | Transcription |
| 78 | 10-11 | with a many | with many | Transcription |
| 83 | 19 | opinioned | opinion | Transcription |
| 85 | 21-23 | economics, and so it would be economically material here. Means that | economics. And so economically material here means that | Transcription |
| 97 | 16 | model | methodology | Clarification |
| 97 | 23 | I'm -- I -- one thing I that I do search | One thing that I do search | Transcription |
| 97 | 24-25 | I've academic research into business ethics, and so I -- I do take particular interest in | I've done academic research into business ethics, and so I -- I do take particular interest in | Transcription |
| 101 | 5 | I would | It would | Transcription |
| 101 | 7 | interest | there | Transcription |
| 105 | 2 | matter | matters | Transcription |
| 112 | 12 | high-volume | high volume | Transcription |
| 115 | 5 | short selling | short-selling | Transcription |
| 116 | 10 | options metric | OptionMetrics | Transcription |
| 120 | 6 | don't see I had | I had | Clarification |
| 122 | 1 | high | buy | Transcription |
| 149 | 9 | SCC | SEC | Transcription |
| 149 | 15 | SCC | SEC | Transcription |
| 152 | 6 | model | methodology | Transcription |
| 158 | 20 | Cassava | Cassava's | Transcription |
| 159 | 7 | tests | test | Transcription |
| 164 | 12 | a internal | an internal | Transcription |
| 166 | 11 | a | an | Transcription |
| 168 | 21 | significant | significance | Transcription |
| 169 | 19 | thought was more compelling is to | thought it was more compelling to | Transcription |
| 170 | 23-24 | did not do need | did not need | Transcription |
| 172 | 11 | Then do I a | Then I do a | Transcription |
| 173 | 15 | a | an | Transcription |
| 182 | 4 | tasked | study | Transcription |
| 195 | 24 | I didn't do a loss, causation, or | I didn't do a loss causation, or | Transcription |
| 197 | 4 | economic | economically | Transcription |
| 202 | 3 | at | to | Transcription |
| 205 | 11 | statistical | statistically | Transcription |
| 205 | 14 | stocks | days | Clarification |
| 209 | 11 | even in | even if | Transcription |
| 209 | 16-17 | impact -- tangled up -- is such | impact is such | Transcription |
| 210 | 11 | impounds into | impounds that information into | Transcription |
| 210 | 12-13 | That information benefits efficient with respect | If the market is efficient with respect | Transcription |
| 210 | 16 | for and some | for some | Transcription |
| 210 | 24 | Arbitragers | Arbitrageurs | Transcription |

| | | | | |
|---|---|---|---|---|
| 216 | 14 | Feinstein Exhibit 3 | Feinstein Deposition Exhibit 3 | Clarification |
| 217 | 10 | model | methodology | Clarification |
| 219 | 11 | that damages model | that the damages methodology | Transcription |
| 223 | 10 | valuations | valuation | Transcription |
| 227 | 1 | arbitragers | arbitrageurs | Transcription |
| 227 | 17 | a | an | Transcription |
| 228 | 19 | would you | you would | Transcription |
| 232 | 1 | be moving | moving | Transcription |
| 237 | 10 | 122 | 222 | Clarification |
| 237 | 12 | 10b5 | 10b-5 | Transcription |
| 239 | 9 | 10b5 | 10b-5 | Transcription |
| 239 | 13 | 10b5 | 10b-5 | Transcription |
| 239 | 18 | 10b5 | 10b-5 | Transcription |
| 247 | 8 | model | methodology | Clarification |
| 248 | 3 | other evaluation tools, | other valuation tools, | Transcription |
| 250 | 5 | means depends | it means depends | Transcription |
| 253 | 16 | in a security fraud case | in a securities fraud case | Transcription |
| 254 | 7 | Feinstein Exhibit 4 | Feinstein Deposition Exhibit 4 | Clarification |
| 255 | 3 | report | reports | Transcription |
| 255 | 4 | Feinstein Exhibit 4 | Feinstein Deposition Exhibit 4 | Clarification |
| 255 | 5 | would you | you would | Transcription |
| 255 | 9 | Evaluation | Valuation | Transcription |
| 259 | 17 | disregard | disregarded | Transcription |
| 260 | 10 | members and is easy | members, and it is an easy | Transcription |
| 263 | 3 | model | methodology | Clarification |
| 267 | 13 | model | methodology | Clarification |
| 267 | 15 | model | methodology | Clarification |
| 270 | 8 | representations and omissions. | misrepresentations and omissions. | Transcription |
| 272 | 5 | misrepresentation omission | misrepresentation and omission | Transcription |

STEVEN P. FEINSTEIN, Ph.D., CFA

Subscribed and sworn before me
this 24th day of July, 2024.

Elizabeth Le
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
12/27/2030

# EXHIBIT C

Review of Quantitative Finance and Accounting (2021) 57:203–234
https://doi.org/10.1007/s11156-020-00943-4

ORIGINAL RESEARCH

# Stock price reactivity to earnings announcements: the role of the *Cammer/Krogman* factors

**O. Miguel Villanueva**[1,2] · **Steven Feinstein**[2,3]

Accepted: 1 October 2020 / Published online: 22 October 2020


**Abstract**
The stock characteristics often used in securities litigation to assess market efficiency are dispositive indicators of reactivity to earnings announcements. Stocks with large capitalization, high trading volume, broad analyst coverage, a large number of market makers, and narrow bid-ask spread are far more likely to react significantly to earnings announcements than stocks without these characteristics. Univariate and multivariate tests compel this conclusion, but provide weaker evidence for analyst coverage.

**Keywords** Earnings announcements · *Cammer/Krogman* factors · Securities litigation · Logit regression · Stock price reactivity · Market efficiency

**JEL Classification** G14 · G18 · K22

## 1 Introduction and scope

The principle of market efficiency is of interest far beyond the arenas of finance academics who ask if only company fundamentals impact stock prices, and investment professionals and their clients who ask if the benefits of active management are worth the costs. Courts and lawyers are interested too. Market efficiency plays a pivotal role in class action securities litigation. A typical class action securities case is one in which a company has allegedly made misrepresentations or omissions that artificially inflated the company's stock price. When the truth emerges, the stock price falls and investors suffer losses. To prevail in litigation and recoup damages under U.S. securities laws, plaintiffs must establish that the subject security consistently reacts to new information, because that form of market

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efficiency links the alleged misrepresentations to the trading prices upon which investors relied.

In the United States, a company that inflates its stock price with misrepresentations or omissions may be liable for damages to injured investors pursuant to the Exchange Act of 1934. However, pursuing a securities fraud claim against a public corporation is extremely expensive,[1] while the potential recovery to an average investor is generally modest. To seek relief, investors band together and pursue their claims in a class action.

In order for such a case to move forward, the court must certify a class of plaintiffs. The court will do so if trying the case on a class basis is deemed superior to each investor pursuing the case individually. Among the conditions required for class certification is proof that all proposed class members relied on the alleged misrepresentations. But, how can the court conclude that all investors relied on the misrepresentations when so many investors do not study company financial statements, monitor conference calls, or listen to company presentations? Many investors may not even know about the alleged misrepresentations. This question was addressed in the landmark *Basic v. Levinson* case of 1988. The Court ruled that when a security trades in an efficient market, such that the price of the security reflects all available information, the market price will also reflect the alleged misinformation. Because all investors rely on the market price when they transact, all investors indirectly rely on the misrepresentations. Establishing reliance through market efficiency is known as the fraud-on-the-market principle.

The Supreme Court in Halliburton II (2014), citing Basic v. Levinson (1988), clarified what type and degree of efficiency are necessary to invoke the fraud-on-the-market principle: "For purposes of accepting the presumption of reliance in this case, we need only believe that market professionals generally consider most publicly announced material statements about companies, thereby affecting stock market prices." Fraud-on-the-market requires that the market for the stock be sufficiently well-developed such that material public information is not ignored, but rather is disseminated, digested, and traded upon, so that market prices reflect publicly available information.

This informational efficiency, meaning that a stock absorbs and reflects new information, is distinct from the concept of fundamental efficiency, which requires that the prevailing stock price conforms at all times to a particular pricing model, typically a discounted cash flow model.[2] That is, in the legal arena, plaintiffs need not prove the correctness of the market price, but rather that the market price absorbs and reflects new information.

As evidence of informational market efficiency, courts welcome empirical tests that demonstrate a statistically significant cause-and-effect relationship between the release of company information and stock price movements. We define this statistically significant relationship as "stock price reactivity." Reactivity may manifest as either a change in the stock price or a change in the stock return distribution, e.g., its mean or volatility, in response to new information.

For a variety of reasons discussed below, however, tests of reactivity may not be feasible or may not be informative. This is especially the case when the alleged fraud involves the company engaging in accounting fraud or making misrepresentations with the express intent of misleading investors to believe that the company met expectations so as to

[1] For example, plaintiffs' legal fees and expenses incurred in the Merck securities litigation that settled in 2016 totaled $232 million according to court filings (Wichert 2016).

[2] The distinction between informational and fundamental efficiency is addressed in Sharpe (1981), Tobin (1984), and Cornell and Haut (2019).

# EXHIBIT D

# INVESTMENTS

SECOND EDITION

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Graduate School of Business
Stanford University

PRENTICE-HALL, INC., Englewood Cliffs, New Jersey 07632

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# Investment Value and Market Price

# 3

## MARKET EFFICIENCY

Imagine a world in which (1) all investors have access to currently available information about the future, (2) all are good analysts, and (3) all pay close attention to market prices and adjust their holdings appropriately. The prices that would lead to an equilibrium in such a market can be termed the *investment values* of the securities.

We can now define an *efficient market:*

> A (perfectly) efficient market is one in which every security's price equals its investment value at all times.

In an efficient market a set of information is fully and immediately reflected in prices. But what information? A popular taxonomy is the following.[1]

| Form of Efficiency | Information fully reflected in Security Prices |
|---|---|
| Strong | All currently known |
| Semistrong | All publicly available |
| Weak | Previous prices of securities |

As we will see, major securities markets appear to conform well to the model of weak-form efficiency and quite well to the model of semistrong efficiency (although lack of a precise meaning for "publicly available" makes this definition slightly ambiguous). The strong form is, as the term suggests, strong, and we will see that markets are not generally efficient in this sense.

In an efficient market any *new* information would be immediately and fully reflected in prices. New information is just that: *new*—a *surprise* (anything that is not a surprise is predictable and should have been predicted before the fact). Since happy surprises are about as likely as unhappy ones, *price changes* in an efficient market are about as likely to be positive as negative. While one might *expect* a security's price to move enough to give (in conjunction with dividend or interest payments) a reasonable return on capital, anything above or below this would, in such a market, be *unpredictable*. In a perfectly efficient market, price changes would be more or less *random*.

Now consider a crazy market, in which prices never bear any particular relationship to investment value. In such a world, price changes would also be random!

Major securities markets are certainly not crazy. They may not attain perfect efficiency, but they are certainly much closer to it than to craziness. As we will see, there is ample evidence that such markets are at least *nearly efficient*. To understand real markets, it is important to understand perfectly efficient markets.

[1] Eugene Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance*, May 1970.

In an *efficient market*, a security's price will be a good estimate of its investment value, i.e., the present value of its future prospects as estimated by well-informed and clever analysts. Any substantial disparity between price and value would reflect market in efficiency. In a well-developed and free market, such inefficiencies are rare. The reason is not hard to find. Major disparities between price and investment value will be quickly noted by alert analysts who will seek to take advantage of their discoveries. Securities priced below value will be purchased, creating pressure for price increases due to increased demand-to-buy. Securities priced above value will be sold, creating pressure for price decreases due to increased supply-to-sell. As investors seek to exploit opportunities created by temporary inefficiencies they will cause the inefficiencies to disappear, denying the less alert and/or less informed any chance to obtain abnormal profits.

In the United States there are thousands of professional security analysts and more amateurs. Not surprisingly, the major U.S. securities markets appear to be quite efficient, as do those of other major countries.

## Problems

1. On the day that Congress passed by a small margin a bill increasing the tax on oil companies, the prices of the stocks of such companies actually went up, even though most stocks fell on that day. Does this suggest that the market is inefficient?
2. Is bad news always bad for stocks in the sense that it will cause their prices to fall?
3. If short-sale rules make price larger than the average marginal value as assessed by investors, then one might assume that the disparity would be greater for stocks about which there is the greatest diversity of opinion. If so, might such stocks continually be overpriced relative to others?
4. When a firm reports its earnings for a period, the volume of transactions in its stock typically increases, but often there is no significant change in price. How can this be explained?
5. Major officers and directors of corporations often make abnormally large profits from trades in the stocks of their own companies. Is this inconsistent with market efficiency?

# EXHIBIT E

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# On the Efficiency of the Financial System

by James Tobin

The United States, as befits the major capitalist economy of the world, has the largest, most elaborate, most sophisticated financial industry in the world. New York is rivalled only by London, which thanks to long-standing international connections and experience, maintains a financial role disproportionate to Britain's declining position in world trade and production. Moreover, finance is one of America's rapid growth sectors.

Just the other day, the *New York Times* listed forty-six business executives whose 1983 compensation (salary and bonus, exclusive of realizations of previously acquired stock options) exceeded one million dollars. What struck me was that sixteen members of this elite were officers of financial companies.[1] No wonder, then, that finance is the favourite destination of the undergraduates I teach at Yale, and that 40 per cent of 1983 graduates of our School of Organization and Management took jobs in finance.[2] Their starting salaries are four times the poverty threshold for four-person families. All university educators know that finance is engaging a large and growing proportion of the most able young men and women in the country. Later in the lecture I shall present further information on the economic size of our financial industries.

James Tobin is Sterling Professor of Economics at Yale University, and won the Nobel Prize in Economic Science in 1981. The article is a slightly revised version of the Fred Hirsch Memorial Lecture given in New York on 15 May 1984. We express our thanks to the Hirsch Memorial Trust for agreeing to the publication of the lecture in this Review.

[1] New York Times, May 2, 1984, p D1. The representation of financial executives would be larger except that a corporation is required to disclose compensation only for its five highest-paid officials. The *Wall Street Journal*, May 21, 1984, p 33, guessed that as many as 15 to 20 officials of Phibro-Salamon, in addition to the five listed, would have been eligible. Furthermore, most Wall Street firms are partnerships or private corporations and do not report. The *Journal* said it was 'a safe bet' that the senior executives or partners of several leading firms belonged on the list, very likely at the top.

[2] Information on job placements from the School's office of Career Planning and Placement; categorization of positions by the author.

Fred Hirsch, gifted economist and social critic, took all institutions, private as well as public, to be fair game for analysis and evaluation. He was not willing to assume on faith or principle that 'markets' work for the best, or to blame distortions solely on government interventions and regulations. Nor did he have illusions that legislatures and bureaucracies work for the best. In the same spirit I decided to use the rostrum which you have given me as Hirsch lecturer to voice some sceptical views of the efficiency of our vast system of financial markets and institutions. These views run against current tides — not only the general enthusiasm for deregulation and unfettered competition but my profession's intellectual admiration for the efficiency of financial markets. Finance theory itself is a burgeoning activity in academia, occupying more and more faculty slots, student credit hours, journal pages, and computer printouts, both in management schools and in economics departments. And as the newspapers have been reporting, finance academics are finding their way to the street.[1]

## Efficiency

Efficiency has several different meanings: first, a market is 'efficient' if it is on average impossible to gain from trading on the basis of generally available public information. In efficient markets only insiders can make money, anyway consistently. Whatever you and I know the market has already 'discounted'. The revealing standard anecdote goes like this: Finance professor is walking on campus with his research assistant, who says, 'Professor, I see a twenty dollar bill on the sidewalk. Should I pick it up?' 'No, of course not, if it were really there, it would already have been picked up.' Efficiency in this meaning I call *information-arbitrage* efficiency.

A second and deeper meaning is the following: a market in a financial asset is efficient if its valuations reflect accurately the future payments to which the asset gives title — to use currently fashionable jargon, if the price of the asset is based on 'rational expectations' of those payments. I call this concept *fundamental-valuation* efficiency.

Third, a system of financial markets is efficient if it enables economic agents to insure for themselves deliveries of goods and services in all future contingencies, either by surrendering some of their own resources now or by contracting to deliver them in specified future contingencies. Contracts for specified goods in specified 'states of nature' are called in economic theory Arrow-Debreu contracts. Kenneth Arrow and Gerard Debreu showed rigorously that a complete set of competitive markets of this kind is necessary and, given some other conditions, sufficient to guarantee the existence of an equilibrium with the optimal properties intuitively perceived by Adam Smith and succeeding generations of free market theorists.[1] I call efficiency in this Arrow-Debreu sense *full-insurance* efficiency.

The fourth concept relates more concretely to the economic functions of the financial industries. They do not provide services directly useful to producers or to consumers. That sentence is an overstatement, because some people enjoy gambling per se, and prefer the securities markets to casinos and race tracks. But the resources devoted to financial services are generally justified on other grounds. These include: the pooling of risks and their allocation to those most able and willing to bear them, a generalized insurance function in the Arrow-Debreu spirit just discussed; the facilitation of transactions by providing mechanisms and networks of payments; the mobilization of saving for investments in physical and human capital, domestic and foreign, private and public, and the allocation of saving to their more socially productive uses. I call efficiency in these respects *functional* efficiency.

Before discussing the American financial system in terms of those four criteria of efficiency, I want to point out that the services of the system do not come cheap. An immense volume of activity takes place, and considerable resources are devoted to it. Let me remind you of some of the relevant magnitudes.

Item: The Department of Commerce categories Finance and Insurance generate $4\frac{1}{2}$-5 per cent gnp, account for $5\frac{1}{2}$ per cent of employee compensation, and occupy about 5 per cent of the employed labour force. They account for $7\frac{1}{2}$ per cent of after-tax corporate profits. About 3 per cent of personal consumption, as measured by the Commerce Department, are financial services. These figures do not include the legal profession. It amounts to about 1 per cent of the economy, and a significant fraction of its business is financial in nature.[2]

Item: The measures just reported do not tell the complete story. They cover only the value added by the labour and capital directly employed. If the inputs of goods and

[1] Recent names in the news include William Silber and Fisher Black, who left New York University and Massachussets Institute of Technology respectively. Many others, who have not made the full leap, serve as consultants. They serve not only during vacations from classes; a day a week free for consulting during terms is standard in business schools.

[1] Their seminal article is 'Existence of an Equilibrium for a Competitive Economy,' *Econometrica*, vol 22, 1954, pp 256-290. See also Debreu, *Theory of Value, An Axiomatic Analysis of Economic Equilibrium*, New York: Wiley, 1959.

[2] Figures from US National Income and Product Accounts Tables, *Survey of Current Business*, US Department of Commerce, July 1983.

services purchased from other industries are included, Finance and Insurance use about 9 per cent of the gnp.[1]

Item: Thirty billion shares of stock, valued at a thousand billion dollars, changed hands in 1983. The turnover was 60 per cent of the outstanding shares. Thus the average holding period is about 19 months. Assuming conservatively that costs are $1\frac{1}{2}$ per cent of dollar volume, traders paid US$14 bn. In fact, the expenses and after-tax profits of New York Stock Exchange member firms were in 1982 US$22 bn, $3\frac{1}{4}$ per cent of the value of transactions. The securities industry employed 232 000 persons, including 61 000 sales representatives, out of approximately 5 000 sales offices.

The turnover of stocks in the United States is greater than in any other country. The closest competitors are Japan, 35 per cent, Germany, 24 per cent, and Britain, 16 per cent.

Our secondary market in bonds, in contrast to stocks, is very inactive. Annual transactions of US$7.2 bn on the New York Stock Exchange are less than 1 per cent of the par value or market value of the listed bonds. For another comparision, consider one-family homes. Annual sales, of which one sixth are new homes, amount to $4\frac{1}{2}$ per cent of the existing stock.[2]

Item: Stocks and bonds are by no means the only instruments traded on organized markets. The pages of the *Wall Street Journal* report markets in options as follows: 4 000 contracts on 475 common stocks varying in date and striking price; 100 contracts on 15 stock indexes; 60 contracts on 5 foreign currencies, 11 contracts on 3 interest rates. There are also some five hundred futures contracts traded, varying as to future date, covering 40 commodities, 5 foreign exchange rates, 10 interest rates or bond prices, and 6 stock indexes. There are even 100 'futures options' contracts. Transactions volumes in all these markets are substantial but difficult to measure in terms comparable to transactions in primary securities.

Item: Our 15 000 commercial banks do business from 60 000 banking offices, one for every 3 800 persons. The operating expenses of commercial banks were US$61

[1] The 9 per cent assumes the same proportion between direct and indirect expenses on labour and capital as estimated in the 1972 input-output table for the US economy. See 'The Input-Output Structure of the US Economy 1972' and 'Dollar Value Tables for the 1972 Input-Output Study', *Survey of Current Business*, February and April 1979.
[2] Figures derived from statistical reports in *SEC Monthly Review*, US Securities and Exchange Commission, and from *1983 Fact Book*, New York Stock Exchange.



bn in 1982. Of these US$10 bn were annualized 'occupancy expenses', US$170 000 per office.[1] In addition 4 250 savings institutions with 25 750 offices had operating expenses of US$14 bn.[2]

## Information-arbitrage efficiency

The long-standing judgment of almost all academics in economics and finance is yes, securities markets are efficient in this sense. The first study to indicate this result was by Alfred Cowles, the founder of the Cowles Commission, now the Cowles Foundation at Yale. An investment adviser himself, chastened by the stock market's gyrations from 1928 to 1933, he showed statistically that an investor would have done at least as well choosing stocks at random as following professional advice.[3] His conclusions have been confirmed many times in different ways. As a statistical matter actively managed portfolios, allowance made for transaction costs, do not beat the market. Prices are a random walk in the sense that their correlations with past histories are too weak to be exploited profitably.[4] These findings contradict the claims of 'technical' analysis. They suggest, in general, that the mathematical expectation of return from resources used in active portfolio management is zero for the clients of brokers and investment advisers and for the owners of mutual funds.

Efficiency in information-based arbitrage does not come free. It requires resource inputs from arbitrageurs, specialists, market-makers. Random walking does not, of course, mean that prices are unresponsive to new information. To the contrary, it means that they respond promptly and fully — and conceivably with little or no trading.

## Fundamental-valuation efficiency

This brings me to the second kind of efficiency, the accuracy with which market valuations reflect fundamentals. Efficiency in this sense is by no means implied by the technical efficiency just discussed. There are good reasons to be sceptical.

[1] Figures based on *Federal Reserve Bulletin*, July 1983, Table A.1, p 501.
[2] Figures from *'83 Savings and Loan Sourcebook*, US League of Savings Institutions, and *1982 Fact Book of Savings Banking*, National Association of Mutual Savings Banks.
[3] Alfred Cowles, 'Can Stock Market Forecasters Forecast?', *Econometrica*, vol 1, 1933, pp 309-324. Alfred Cowles and Herbert E Jones, 'Some A Posteriori Probabilities in Stock Market Action,' *Econometrica*, vol 5, 1937, pp 280-294.
[4] Burton G Malkiel, *A Random Walk down Wall Street*, New York; Norton, 1973. John G Cragg and Burton G Malkiel, *Expectations and the Structure of Share prices*, Chicago: University of Chicago Press, 1982. (A National Bureau of Economic Research monograph.)

# EXHIBIT F

# How Efficient Is Sufficient: Applying the Concept of Market Efficiency in Litigation

*Bradford Cornell and John Haut**

*The concept of market efficiency has been adopted by courts in a variety of contexts. In reality, markets can never be perfectly efficient or inefficient, but exist somewhere in between depending on the facts and circumstances. Courts, therefore, face a problem in deciding how efficient is sufficient in any particular legal context. Because market prices incorporate the views of numerous market participants, courts have often been willing to presume that a market is efficient so long as the appropriate criteria are satisfied. However, those criteria are different for different types of cases, such as securities class actions, appraisal actions, and cram downs in bankruptcy.*

Few concepts from financial economics have had a bigger impact on the law than the notion of market efficiency. In his classic article that introduced the concept in 1970, Eugene Fama said, "*A market in which prices always 'fully reflect' available information is called efficient*."[1]

The concept of market efficiency first entered the law in a major way with the decision in *Basic, Inc. v. Levinson*.[2] In *Basic*, the Supreme Court noted that the fraud-on-the market theory, which creates a rebuttable presumption of reliance on the integrity of a security's market price, is based on the premise that "the market price of shares traded on well-developed markets reflects all publicly available information and, hence, any material misrepresentations."[3]

Fama's definition, and the language in *Basic*, make it sound like the concept of efficiency is discrete—financial markets are either efficient or they are not. This dichotomy is incorrect. In fact, as discussed in detail below, financial markets can never be either fully efficient or inefficient. The modern way of thinking about efficiency is as a relative concept. In their widely adopted text, Campbell, Lo, and MacKinlay use an analogy to highlight the importance of thinking in terms of relative efficiency:

* Bradford Cornell is with California Institute of Technology. John Haut is with Compass Lexicon. We would like to thank Phil Anker, Elisabeth Browne, Jim Rutten, Joseph Kroetsch, Penny Shane, and Allen Ferrell for helpful comments on earlier drafts.

1. Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383, 383 (1970) (emphasis added).
2. 485 U.S. 224 (1988).
3. *Id.* at 246.

that is, to scientifically measure the degree of efficiency of a particular market between the upper and lower bounds, so as to serve as a basis for legal analysis. The short answer is a no with the qualification that it depends on exactly what is meant by efficiency. In particular, it is important to distinguish between *informational* efficiency and *fundamental* efficiency.

As defined by Sharpe, a market is informationally efficient if prices respond immediately so that investors cannot make abnormal returns by trading in response to public announcements. It is important to stress that informational efficiency relates solely to the *speed* of the market reaction to information, not whether it responds rationally or accurately. By contrast, a market that is fundamentally efficient is one that gets prices "right." By "right," we mean the market price equals the present value of expected future cash flows discounted at the appropriate cost of capital—what is often called the fundamental value. Notice that if a market is fundamentally efficient, by definition it will always be informationally efficient because price adjusts immediately to maintain equality with fundamental value.[8]

## Relative Efficiency and the Law

### Applications of Market Efficiency in Securities Litigation

As noted above, courts have developed various criteria in place of asset pricing models in an effort to assess efficiency. For instance, following the logic of Grossman and Stiglitz, the degree of efficiency should be related to the cost of procuring and analyzing value-related information and the benefits from so doing. Presumably, the benefits are related to the size of the positions that an investor can take without moving prices unfavorably. This suggests that bigger, deeper, and more liquid markets are likely to be more efficient. In addition, the availability and cost of information affects the cost of doing research. As a result, markets supported by sophisticated information networks and regulations that require widespread access to information, such as highly developed financial markets, should, therefore, be more efficient.

Applying the foregoing reasoning in 10b-5 securities cases, courts have generally adopted criteria laid down in *Cammer v. Bloom*[9] and *Krogman v. Sterritt*[10] when assessing efficiency in the context of class certification if such efficiency is challenged, but do not consider market efficiency during the damages phase. The first of the two cases, *Cammer*, pointed to five indicia of efficiency: (1) average weekly trading volume of 2 percent or more of the outstanding shares;[11] (2) "a significant number of analysts follow[ing] and report[ing] on the stock during the class period";[12] (3) numerous market makers;[13] (4) eligibility

8. *See* William F. Sharpe, Investments 71–72 (2d ed.1981).
9. 711 F. Supp. 1264 (D.N.J. 1989).
10. 202 F.R.D. 467 (N.D. Tex. 2001).
11. *Cammer*, 711 F. Supp. at 1286.
12. *Id.*
13. *Id.* at 1287.